Algebra 1   6.2
Solve systems of equations using substitution method
Solve problems using substitution of equations

solve
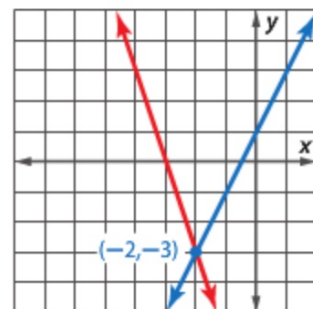solve by graphing
substitution
substitution method

activity: cut & paste
whiteboards

$$X = 2$$
$$y = x + 5$$

(−2,−3)

Are there ever any complications when solving by graphing?

recipe: if you run out of one ingredient...
coach: two players are equally skilled...

$y = 4x + 5$

$13 = 4 \cdot 2 + 5$

$13 = 8 + 5$

(x, y)

$(2, 13)$

$2x + y = 17$

$2 \cdot 2 + 13 = 17$

$4 + 13 = 17$

$y = 4x + 5$

$4 \cdot 2 + 5$

$8 + 5$

$2x + 4x + 5 = 17$

$6x + 5 = 17$

$\quad -5 \quad -5$

$\dfrac{6x}{6} = \dfrac{12}{6}$

$y = \boxed{3x - 2}$ $-11 = 3 \cdot -3 - 2$

$-11 = -9 + -2$

$y = 3 \cdot -3 - 2$

$= -9 - 2$

$= -11$

$2x - 1y = 5$

$2 \cdot -3 - 11 = 5$ $2x + -1(3x - 2) = 5$

$-6 + 11 = 5$ $2x - 3x \pm 2 = 5$

$-x + 2 = 5$

$-x = \dfrac{-2}{5} \quad -2$

$\dfrac{-x}{-1} = \dfrac{3}{-1}$

(x, y)

$\smile (-3, -11) \smile$

$x = -3$

$$y = 2 \cdot -2 + 1$$
$$= -4 + 1$$
$$= -3$$

Example 1 Solve a System by Substitution

Use substitution to solve the system of equations.

$y = 2x + 1$ ←   **Step 1** The first equation is already solved for y.
$3x + y = -9$

$$3 \cdot -2 + -3 = -9$$
$$-6 + -3 = -9$$

$$3x + \boxed{2x + 1} = -9$$

$$5x + 1 = -9$$
$$ -1 \quad -1$$
$$\frac{5x}{5} = -\frac{10}{5} \quad x = -2$$

$$-3 = 2 \cdot -2 + 1$$
$$-3 = -4 + 1$$

$$(-2, -3)$$

You are the coach...
Who is on the sub list?

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KeyConcept Solving by Substitution

Step 1 When necessary, solve at least one equation for one variable.

Step 2 Substitute the resulting expression from Step 1 into the other equation to replace the variable. Then solve the equation.

Step 3 Substitute the value from Step 2 into either equation, and solve for the other variable. Write the solution as an ordered pair.

$y = 3x - 2$ $y = 2x - 5$

$3x - 2 = 2x - 5$
$-2x \qquad -2x$
_____
$x - 2 = -5$
$\quad +2 \quad +2$
_____
$x = -3$

6.2
9-Bows
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$$-2 = 4 \cdot 1 - 6$$

$-2 = 4 + -6$

1A. $y = 4x - 6$

$5x + 3y = -1$

$5 \cdot 1 + 3 \cdot -2 = -1$

$5 + -6 = -1$

$5x - y = -1$

$5x - (4x - 6) = -1$

$5x + 3(4x + ^-6) = -1$

$5x + 12x + ^-18 = -1$

$17x + ^-18 = -1$

$+18 \quad +18$

$17x = 17$

$x = 1$

$(1, -2)$

1B. $2x + 5y = -1$
$y = 3x + 10$

How is this problem different?

Use substitution to solve the system of equations.

$x + 2y = 6$
$3x - 4y = 28$

GuidedPractice

2A. $4x + 5y = 11$
$y - 3x = -13$

2B. $x - 3y = -9$
$5x - 2y = 7$